

Most of these come from marking our own students' papers, so they are the mistakes made in this classroom, not only the ones examiners report worldwide. The × line is what was written; the ✓ line is what would have scored. × , ✓

Across every paper

✗ Writing the final number with no unit, or with the wrong one.

✓ **Every answer carries its unit – N, J, W, m/s^2 – and the unit tells you if the working was right.**

A correct number with no unit loses the final mark, and a wrong unit usually means a wrong formula.

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✗ Writing only the answer to a calculation.

✓ **Formula, then substitution, then answer. Credit is given for correct working even when the number is wrong.**

Examiners state this directly, and it is the difference between zero and most of the marks when one step slips.

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✗ Rounding at each step of a multi-step calculation.

✓ **Keep the full value until the last line.**

Examiners warn that rounding too soon in a question with several steps produces an incorrect final answer.

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✗ Using $g = 10 \text{ N/kg}$ when the front page says 9.8.

✓ **Use the value printed on the front of the paper.**

Examiners raise this twice in one report – the instruction is on the cover of every paper.

g

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✗ Recalling the answer to a similar question you have seen before.

✓ **Read this question, underline the command word and the key words, and answer what it actually asks.**

Examiners advise reading the question through very carefully to avoid answering a different one.

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■ Look at the marks and the space given. Examiners state that both indicate the type and length of answer expected.

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1 · Motion, forces and energy

✗ Using $s = vt$ for an object accelerating from rest.

✓ $s = \frac{1}{2}at^2$, or use the average velocity.

Marked in our own class: $s = vt$ applies only at constant velocity, and a balloon released from rest is not.

$s = vt$

class

✗ Saying weight decreases as an object falls faster.

✓ **Weight is constant near the surface; it is AIR RESISTANCE that increases with speed.**

A class answer confused which force changes – this is what terminal velocity depends on.

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class

✗ Calculating impulse from the speeds without signs.

✓ **Take one direction as positive: a change from -12 to $+16$ m/s is a change of 28 m/s.**

Marked in class. Momentum is a vector, so a rebound doubles the change rather than cancelling it.

class

✗ Calculating the cost of electricity for one hour when the question said two.

✓ **Read the time in the question, and convert W to kW before using the cost per kWh.**

A class script did both conversions correctly and then used the wrong time.

class

2 · Thermal physics

✗ Defining specific heat capacity as energy absorbed over time.

✓ **The energy needed to raise the temperature of 1 kg of a substance by 1 °C.**

Marked in class: energy over time is POWER, which is a different quantity entirely.

class

✗ Describing solid particles as having ‘fixed motion’.

✓ **They VIBRATE about fixed positions in a regular arrangement.**

A class answer showed partial understanding; the mark needs both the vibration and the regular arrangement.

class

✗ Answering ‘what readings does the student take’ by describing what happens to them.

✓ **List the readings: temperature, time, mass.**

Marked in class – the answer discussed thermal expansion, which was not what was asked.

class

3 · Waves

✗ Saying ultraviolet is used in optical fibres.

✓ **Infrared – it has low attenuation in glass.**

Marked in class. The reason matters as much as the name: high frequency for data rate, low attenuation for distance.

class

✗ Describing an image as diminished when it is magnified.

✓ **Check all three properties: enlarged or diminished, upright or inverted, real or virtual.**

A class script identified the image as enlarged and virtual, then circled ‘diminished’ as well.

class

✗ Explaining a converging lens for long sight by saying it ‘helps the eye see’.

✓ **It converges the rays BEFORE they enter the eye, so the image forms on the retina instead of behind it.**

Marked in class: the mark is for where the image forms, not for the lens being helpful.

class

✗ Naming the eye defect by its symptom – ‘cannot see near objects’.

✓ **Name it: hypermetropia, or long sight.**

A class answer described the symptom; examiners want the name of the defect.

class

✗ Saying total internal reflection happens when light hits the boundary at any angle.

✓ **The angle of incidence must be GREATER than the critical angle.**

Stated as a mark-scheme requirement – the condition is the mark.

MS

4 · Electricity and magnetism

✗ Saying a thick wire has more resistance because there is more metal.

✓ **Resistance falls as the cross-sectional area rises: $R \propto l/A$.**

Marked in class – short and thick means least resistance, and the relationship is what the question tests.

class

✗ Quoting $R = \rho l/A$ and giving a number with no substitution shown.

✓ **Show how ρ was found from the first wire before using it on the second.**

A class script stated the right formula and lost the marks because the intermediate value never appeared.

class

✗ Using $V_p/I_p = V_s/I_s$ for a transformer.

✓ **For a 100% efficient transformer, $V_p I_p = V_s I_s$ – the POWERS are equal.**

Marked in class: the wrong relationship gives a plausible current and a wrong answer.

class

✗ Using iron for a permanent magnet, or steel for an electromagnet core.

✓ **Soft iron loses its magnetism quickly, so it is the electromagnet core; steel keeps it, so it is the permanent magnet.**

Marked in class – the property required is the opposite in each case.

class

✗ Confusing the split-ring commutator with slip rings.

✓ **A d.c. motor uses a split-ring commutator to reverse the current each half turn; an a.c. generator uses slip rings.**

Marked in class. Both involve coils, brushes and magnets, which is why the parts get swapped.

vs

class

✗ Showing a stronger magnetic field by drawing longer field lines.

✓ **Draw the lines CLOSER TOGETHER.**

Marked in class – spacing shows strength, and lines are always closer near the wire.

class

5 · Nuclear physics

✗ Explaining beta decay as the nucleus ‘losing an electron’.

✓ **A neutron becomes a proton and an electron; the proton stays and the electron is emitted.**

Marked in class: the mark is for what happens inside the nucleus, not for what leaves it.

class

✗ Explaining charge conservation by describing nucleon number.

✓ **Charge: a neutron is 0, a proton is +1 and a beta particle is –1, so the totals balance.**

A class script described mass-number conservation when the question asked about charge.

class

✗ Halving the total count rate without subtracting the background first.

✓ **Subtract background, halve the source count for each half-life, then add background back.**

Marked in class: $200 - 20$ gives 180, which halves to 90, and the reading is 110.

class

✗ Reading the top number of a nuclide symbol as the number of protons.

✓ **The top number is the NUCLEON number – protons plus neutrons.**

Marked in class on a chlorine-35 question.

class

6 · Space physics

✗ Saying stars shine forever, or that the Solar System has several stars.

✓ **A star fuses hydrogen into helium and its supply is finite; the Solar System has one star.**

Both were marked wrong in class in the same topic.

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class

✗ Answering ‘another way to measure distance’ by restating Hubble’s law.

✓ **Name a different method – standard candles, such as Cepheid variables.**

Marked in class: the answer described the relationship again instead of an alternative.

class

■ Giving a reason for reclassifying Pluto: it is small and has not cleared its orbit. Examiners expect the property, not just the label ‘dwarf planet’.

class

The practical paper – Paper 5 and Paper 6

✗ Recording readings to different numbers of decimal places from the same instrument.

✓ **Record every reading to the precision the instrument allows.**

Examiners name this ability directly, along with quoting a derived result to an appropriate number of significant figures.

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✗ Labelling a results-table column with a quantity and no unit.

✓ **Both, every time: ‘time / s’.**

Stated as a mark-scheme requirement: each column must be labelled with both quantity and unit.

MS

✗ Choosing a scale that puts the points in one corner, or drawing the best-fit line through the first and last point.

✓ **Spread the points across the grid, and balance the line between them.**

Examiners record difficulty with both scale choice and best-fit lines in the same report.

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■ Describe apparatus you have actually used. Examiners state that successful candidates showed evidence of having performed a wide range of practical work and could describe the apparatus and its use.

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